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Meteorological Society, October, 1904, Mr. A. L. Rotch, of Blue Hill Observatory, describes an instrument for determining the true direction and velocity of the wind at sea, devised by himself and constructed by Casella, of London. With this instrument the angles of the apparent and true wind relative to the ship are measured directly, and by utilizing the ship's course and speed as a base, absolute directions and velocities of both winds are immediately ascertained.

GENERAL CIRCULATION OF THE ATMOSPHERE.

THE report by Hildebrandsson, to the International Meteorological Committee, on the international cloud observations, the principal conclusions in which were some months ago referred to in these 'Notes,' is published in English in the *Quarterly Journal of the Royal Meteorological Society*, Vol. XXX., October, 1904. This study has attracted much attention because of the new views advanced in it concerning the general circulation of the atmosphere, and it is well to have it accessible to a larger number of readers than was the case with the original publication in French.

KITE-FLYING AT SEA.

DURING the past summer, the Prince of Monaco has been investigating the meteorology of the free air in the northeast trade wind latitudes. Kites have been flown from the yacht *Princess Alice*, and an altitude of nearly 17,000 feet was attained on one occasion. In this kite work, Dr. Hergesell was actively interested and he accompanied the expedition, but Americans will recall that the first suggestion concerning the use of kites for exploring the atmosphere over the oceans was made by Mr. A. L. Rotch, of Blue Hill Observatory.

METEOROLOGICAL INSTITUTE OF SAXONY.

THE 'Jahrbuch' of the Royal Meteorological Institute of Saxony for 1900, compiled by Dr. Paul Schreiber, contains an elaborate critical discussion of the pressure observations made in Saxony between 1866 and 1900, as well as the meteorological summary for the year 1900, with special discussions of evaporation measurements, thunderstorms and depth of snowfall.

R. DE C. WARD.

BOTANICAL NOTES.

STUDIES IN PLANT FECUNDATION.

A VERY useful compilation representing the present state of our knowledge of the process of fecundation in plants has recently appeared from the hand of Professor D. H. Mottier in one of the publications (No. 15) of the Carnegie Institution of Washington, under the title of 'Fecundation in Plants.' It is a thick octavo pamphlet of nearly two hundred pages, with seventy-five text illustrations. The author's purpose is well stated in the preface to be 'to present the subject of fecundation in the vegetable kingdom by the discussion of concrete cases, selecting from the great groups of plants certain typical representatives in which the sexual process seems to have been most thoroughly investigated.' In carrying out this purpose he devotes an introductory chapter of sixty pages to the discussion of typical problems of nuclear division and cell formation, especially in spore mother-cells, closing the chapter with an interesting ten-page discussion of the significance of the sexual process. In the latter the author is very emphatic in his disbelief in a chemical theory of fecundation. "Although the development of a rudimentary embryo induced by artificial means may proceed in the same manner as the product of normal fecundation, yet the artificial stimulus can not be looked upon as being equivalent to the sexual process. In the case of the former, we are dealing with a stimulus which merely starts growth, but a mature individual is never developed. The sting of an insect or some similar stimulus may call forth a growth in a leaf of an oak which results in a gall, a local and limited growth, but never in an oak tree, and we can not for one moment think of comparing such a stimulus to a sexual process." And again, 'The author does not agree with those who regard the sexual process merely as a restoration to the egg of the power of growth and division.'

The second chapter includes the discussion of typical cases of fecundation in which motile isogametes are concerned, the examples selected being *Ulothrix*, *Hydrodictyon* and *Ectocarpus*. Here he shows 'that fecundation

consists in the fusion of the sexual nuclei together with the cytoplasm of the gametes.' In Chapter III. fecundation by non-motile isogametes is considered, as illustrated by *Sporodinia*, *Closterium*, *Cosmarium*, the Diatoms (*Rhopalodia*, *Cocconeis*) and *Basidiobolus*. In Chapter IV. the heterogamic fecundation of *Sphaeroplea*, the Fucaceæ, *Volvox*, *Ædogonium*, *Coleochaete*, *Vaucheria*, *Albugo*, *Achlya* and *Saprolegnia* are discussed. Then follow chapters on 'the type of the Ascomycetes and Rhodophyceæ (V.), 'the Archegoniates' (VI.), including Pteridophyta and Gymnosperms, and 'Angiosperms' (VII.). In this last chapter the author says, 'the view held here is that pollen grains and embryo-sacs are respectively micro- and macrospores.' Here the author has permitted some confusion to creep into his usually lucid text, for a little later he uses the expression 'the embryo-sac or female gametophyte' (pp. 169 and 173). Certainly an embryo-sac can not be both macrospore and female gametophyte. A voluminous bibliography, including 187 titles, closes the paper, which can not but prove to be very useful to botanical teachers and students.

TECHNICAL MYCOLOGY.

SEVEN years ago Doctor Franz Lafar, private docent in the technical high school at Hohenheim, issued the first part of a most useful work under the title 'Technische Mykologie.' About a year ago the second part appeared, and with it the announcement that the present edition was to be discontinued, and that a second, much enlarged edition was to be undertaken immediately. Of this new edition the first *Lieferung* of 160 pages has just appeared. It includes an introduction of 28 pages—mostly historical—by Dr. Lafar, followed by 121 pages by Dr. Migula devoted to the bacteria. Near the close of the *Lieferung* we have the beginning of Dr. Lindau's treatment of the true-fungi (*Eumycetes*). If one may judge from these pages, this edition is to be a notable addition to mycological literature. From the prospectus it is learned there are to be five volumes, the first of which is to be devoted to the general

morphology and physiology of the fungi. The succeeding volumes are to be more or less technical, dealing with the relation of the fungi to various industries, the soil, water-supply, etc.

PARTHENOGENESIS IN PLANTS.

IN a recent number of the *Berichte der deutschen Botanische Gesellschaft* (Vol. XXII.), Dr. J. B. Overton describes the cytology of parthenogenesis in *Thalictrum purpurascens*, a common American weed. The author has prepared a summary of this paper, as follows:

In a previous experimental and morphological study the author discovered that this plant sets seed freely in the absence of pollination and that the embryos could develop normally from fertilized egg-cells and also parthenogenetically from unfertilized egg-cells. In the present investigation the author studied the cytological phases of the subject. He was able to determine that the number of chromosomes was reduced by one half in the pollen-mother-cells by means of the heterotypical mitosis. Similar conditions were also found in the typical embryo-sac mother-cell, which gives rise to true tetrads. He also found in exceptional cases embryo-sac mother-cells in which no reduction takes place. The division, instead of being heterotypical, appears to resemble both vegetative and heterotypical mitoses. This division, therefore, represents a transitional stage between the ordinary somatic and the heterotypical divisions. Instead of twelve chromosomes, the reduced number, the spindle shows twenty-four chromosomes. In those embryos which developed from normally fertilized eggs as well as those which developed parthenogenetically, he found twenty-four chromosomes. Twenty-four chromosomes were always found in purely vegetable cells. The author concludes that only those eggs with the somatic number of chromosomes are able to develop parthenogenetically, while those which contain the reduced number of chromosomes must be fertilized. The works of Juel and Murbeck show that *Antennaria alpina*, several species of *Alchemilla* and *Taraxacum officinale*, have acquired the habit of complete parthenogenesis. *Thalictrum purpurascens* has only partly attained the power of propagating itself parthenogenetically. The author believes it possible that the failure of pollination, due to a separation of staminate and pistillate plants, has acted as a stimulus to final parthenogenetic development.

THE WESTERN SAND CHERRY.

MOST eastern readers are well acquainted with the low, much-branched shrub known as the sand cherry (*Prunus pumila*), and bearing small fruits which have a thin flesh. Probably few of them are familiar with the western sand cherry (*Prunus besseyi*) which grows on the prairies and great plains from Manitoba and Minnesota to Nebraska and Kansas. The latter has a much larger, short-stalked cherry, which has a colored, juicy flesh. The plants of the two species are much alike, but there are constant differences in habit and fruit sufficient to warrant their separation. For practical purposes the two are very distinct, the western species, even in the wild state, being valuable for culinary purposes.

In a recent bulletin (No. 87) of the North Dakota Experiment Station, Professor Hanson makes a discussion of this fruit, giving the results of his experiments extending over fourteen or fifteen years. These may be summarized as follows:

1. It is exceedingly variable in the size and quality of its fruit, but all forms are acceptable for culinary use.

2. From them 100 varieties have been selected, and are now under propagation. Some of these bear fruit from three fourths to seven eighths inches in diameter and of a quality acceptable for eating without cooking.

3. It hybridizes readily with at least three other species.

4. Seedlings bear fruit in the third year.

5. "After fruiting many thousands of seedlings it appears reasonable to believe that in this species we have a bush cherry that can be raised to advantage upon the most exposed prairies."

As to the present value of this species, Professor Hansen says:

1. "It is a native northwestern prairie fruit worthy of being tamed and transferred to the small fruit garden."

2. "It is yet in the early stages of development; too much must not be expected at first."

3. "Even unselected seedlings are not to be despised in the drier regions of the northwest, where the small fruits of the eastern states are usually a failure."

4. "At least one of its hybrids (the 'Compass,' = Sand Cherry \times Miner Plum) is worthy of a place in the home garden, and may be considered the forerunner of a new race of fruits."

5. "Propagators will find the sand cherry worthy of attention as a stock in winter root-grafting of the native plum."

6. "For orchard houses and amateur plantations it can be used to advantage, as a dwarf stock for plums, peaches, apricots and some other stone fruits."

7. "It is worthy of a place on the list of desirable low ornamental shrubs for the foreground in clumps of larger-growing species."

The professor's experience with the sand cherry has been so favorable that he ventures the following predictions:

1. "It will be found of great value in the commercial propagation of some of the stone fruits."

2. "From it will be developed by selection a race of bush fruits with fruits equal to California cherries in size, and of quality acceptable for table use."

3. "From it will be developed a race of hybrid fruits of a new type by hybridizing with choicer fruits: these new creations will be hardy and fruitful on the most exposed prairies."

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COLLEGE-ENTRANCE OPTION IN ZOOLOGY.*

THE following report will be presented to the American Society of Zoologists at the meeting at Philadelphia in December. It is published here in order to call forth criticisms and suggestions from schools and colleges which have not been reached through correspondence. Communications relating to the report may be handed to any member of the undersigned committee, or addressed to the chairman at Teachers College, Columbia University.

Believing that zoology should have a place in general liberal education and recognizing that for the great majority of citizens formal

* Report of a committee appointed by the American Society of Zoologists.